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A METRIC STUDY OF TWO THOUSAND CHECK SIGNATURES.

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The various methods of committing forgery and the means available for its detection were discussed by the writer in the *American Law Register*, Vol. xxix, 1890, p. 553. In that paper we stated that perfect identity of two signatures is very strong, if not conclusive, evidence of fraud, referring to the famous Howland will case, which will be found abstracted on p. 562 of the same volume.

A similar question arose in the case of the will of the late Senator Joseph E. McDonald, recently tried at Nobleville, Indiana, in which the verdict was that the will was a forgery.

In the preparation of that case it was thought expedient to investigate the question of the length of signatures written in the ordinary course of business by the same person, with the view of ascertaining, if possible, the law, if any, governing the same. With that end in view the writer measured the length of 700 of his own checks drawn on the First National Bank of Chicago between the years 1884 and 1888, and also 300 checks drawn on the Merchants' Loan and Trust Company in the years 1891 and 1892. The former were drawn on smaller blanks than the latter, and hence will be separately discussed for reasons hereinafter stated.

Six hundred and twenty-six check signatures of Mr. Alpheus H. Snow, 133 of Mr. Parke Daniels, and several hundred check signatures of other parties were also examined.

While making these measurements we also compared the checks of the same persons respectively *inter sese*, with the view of finding, if there were any, such as were exactly, or within very narrow limits, identical in size and form, but found not a single instance of such identity. We had not proceeded far in the investigation before it became apparent that the length of the signature depends to some extent upon the length of the line upon which it is written; and that even in cases where the line is longer than is necessary for the signature, as ordinarily written, it invariably affects the length of the signature; so that the average length of the signature diminishes with the length of the line upon which it is written. It is obvious, therefore, that there can be no settled mean length of signatures unless they are written upon lines of substantially the same length. By *lines* in this connection is not meant lines running entirely across the sheet of paper, but such lines of convenient length as are usually found upon blank checks and other similar documents. Having arrived at this conclusion, we endeavored to ascertain whether those signatures written on similar blank checks under substantially the same conditions were governed, as we supposed, by the general law of probability, so that the platted curves hereinafter described, would form what is known as the "probability curve."

The results arrived at were not conclusive upon this point, though we are of the opinion that, given a sufficiently large number of signatures written upon similar blanks and under the same conditions, they would be governed by the law above referred to.

The method adopted was as follows: The lengths of the separate signatures of each person were added together and the sum divided by the number of signatures, giving the mean length. The length of each separate signature was then subtracted from this mean length, giving a series of remainders *plus* and *minus*. These residuals were then classified and curves platted in which the ordinates represent the number of signatures and the abscissas their residuals, plus and minus. The result of this labor, which was not inconsiderable, did not entirely realize our expectations, though in the scientific examination of any question even negative results are valuable.

In the diagram marked "A" is given a graphic representation of the measurement of 700 checks of the writer in the manner above described.

In the diagram marked "B" is given the result of a similar examination of 388 checks of Mr. Alpheus H. Snow.

In the diagram marked "C" is given the result of a similar measurement of 133 signatures of Mr. Parke Daniels. In the tables which follow are given all other details of these measurements, which probably require no further explanation.

The will of Mr. McDonald was alleged to have been executed in duplicate. One counterpart was originally propounded for probate: the other counterpart was a carbon copy of the first. The signatures to the two counterparts were substantially identical. No cut could disclose this identity as satisfactorily as an inspection of the originals.

The following conclusions seem warranted by the facts:

(1) The two signatures of the alleged testator, Joseph E. McDonald, and of the alleged subscribing witness, Parke Daniels, are so nearly identical as to warrant the conclusion that the will is a forgery.

(2) The length of the signatures of the same person depends to some extent upon the length of the lines upon which they are written, increasing and decreasing with the same, even when such lines are ample in length for the ordinary signature of the writer.

(3) No satisfactory conclusion can be predicated as to the length of a signature under ordinary conditions as they occur in practice, unless a large number of genuine signatures is available, and then only when the disputed signature falls considerably beyond the limits established by such signatures.

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Table I. (Signatures of M. D. Ewell).

The lengths are in millimetres: 1 millimetre equals 1-25th inch approximately.

No.	Year.	Longest Sig.	Shortest Sig.	Sum.	Mean.	Remarks.
25	1884			1380.8	(1st 100)	Book A. Drawn on First National Bank of Chicago.
25	"			1289.9		
25	1885			1295.0		
25	"			1220.0		
100		71.5	37.7	5185.7	51.9	
25	1884			1297.2	(2d 100)	Same.
25	"			1368.6		
25	1885			1317.7		
25	"			1263.3		
100		67.0	40.2	5246.8	52.5	
25	1885-6			1281.2	(3d 100)	Same.
25	"			1286.1		
25	"			1301.9		
25	"			1321.3		
100		75.6	34.4	5190.5	51.9	
25	1886			1149.0	(4th 100)	Same.
25	"			1229.8		
25	"			1216.4		
25	"			1205.4		
100		62.5	33.0	4800.6	48.0	
25	1886			1151.8	(5th 100)	Same.
25	"			1209.5		
25	"			1251.9		
25	"			1232.7		
100		66.0	32.8	4845.9	48.5	
25	1887			1144.2	(6th 100)	Same.
25	"			1296.1		
25	"			1245.6		
25	"			1240.9		
100		71.4	33.7	4926.8	49.3	

TABLE I. (Continued).

No.	Year.	Longest Sig.	Shortest Sig.	Sum.	Mean.	Remarks.
25	1887–8			1182.3	(7th 100)	Same.
25	"			1284.5		
25	"			1234.9		
25	"			1225.7		
100		64.0	34.5	4927.4	49.3	
700	1884–8	75.6	32.8		50.2	See Plat "A."
25	1892			1483.8	New series. (1st 100)	Book A. Drawn on Merchants' Loan & Trust Co. Longer lines for sigs.
25	"			1439.6		
25	"			1366.1		
25	"			1378.1		
100		74.2	43.6	5667.6	56.7	
25	1891–2			1446.0	(2d 100)	Same.
25	"			1318.1		
25	"			1290.1		
25	"			1399.6		
100		71.2	37.0	5453.8	54.6	
25	1891			1343.8	(3d 100)	Same.
25	"			1283.8		
25	"			1349.0		
25	"			1324.5		
100		68.3	40.5	5301.1	53.0	
300		74.2	37.0		54.7	Not platted.

TABLE II. (SIGNATURES OF ALPHEUS H. SNOW.)

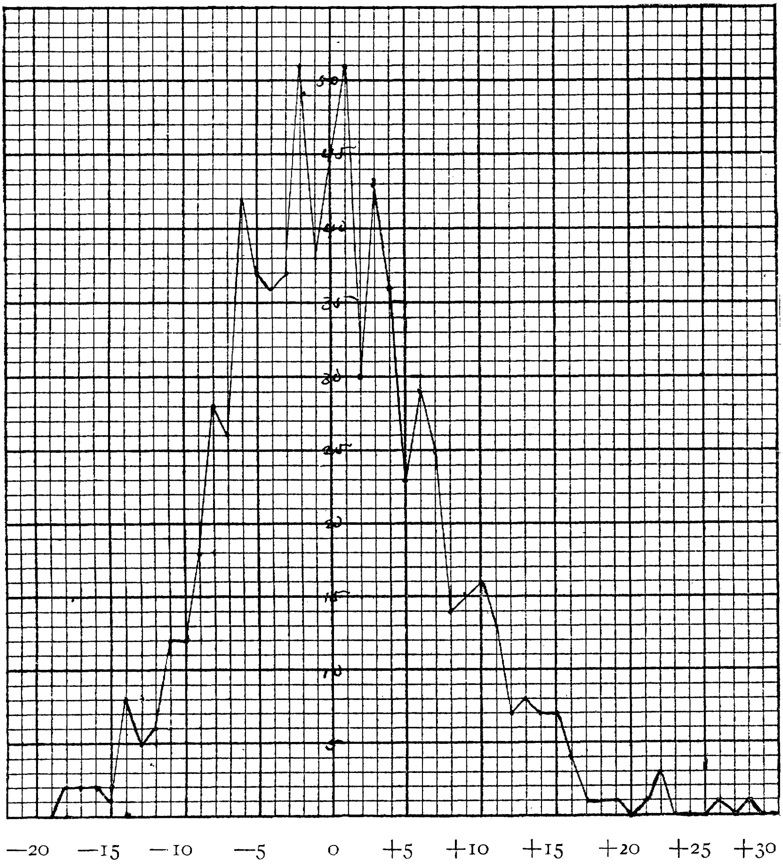
No.	Year.	Longest Sig.	Shortest Sig.	Sum.	Mean.	Remarks.
20	1890			1434.7		Book B. Drawn on blanks with lines 137 to 139 mm. in length; a very few 111 mm. in length
20	"			1543.0		
20	1891			1565.9		
20	"			1553.9		
20	"			1678.0		

TABLE II. (Continued.)

No.	Year.	Longest Sig.	Shortest Sig.	Sum.	Mean.	Remarks.
20	1891			1702.3	Second series.	
20	"			1566.3		
20	"			1564.4		
20	"			1450.4		
20	"			1628.9		
20	1891–2			1633.7		
20	1892			1630.0		
20	"			1596.4		
20	"			1685.2		
20	"			1611.5		
20	"			1474.2		
20	1890			1394.2		
20	"			1422.1		
20	"			1447.2		
8	"			559.6		
388		109.1	56.0	30,141.9	77.7	Plat "B."
12	1887			773.9		Book B. Drawn on blanks with lines 82 to 90.5 mm. in length.
20	1888			1363.9		
20	"			1343.2		
20	"			1304.2		
20	"			1331.4		
20	1889			1340.8		
20	"			1387.4		
20	"			1373.2		
20	"			1434.3		
20	"			1401.2		
20	1890			1372.1		
20	"			1341.9		
6	"			418.6		
238		84.7	53.0		67.9	Not platted.

TABLE III. (SIGNATURES OF PARKE DANIELS.)

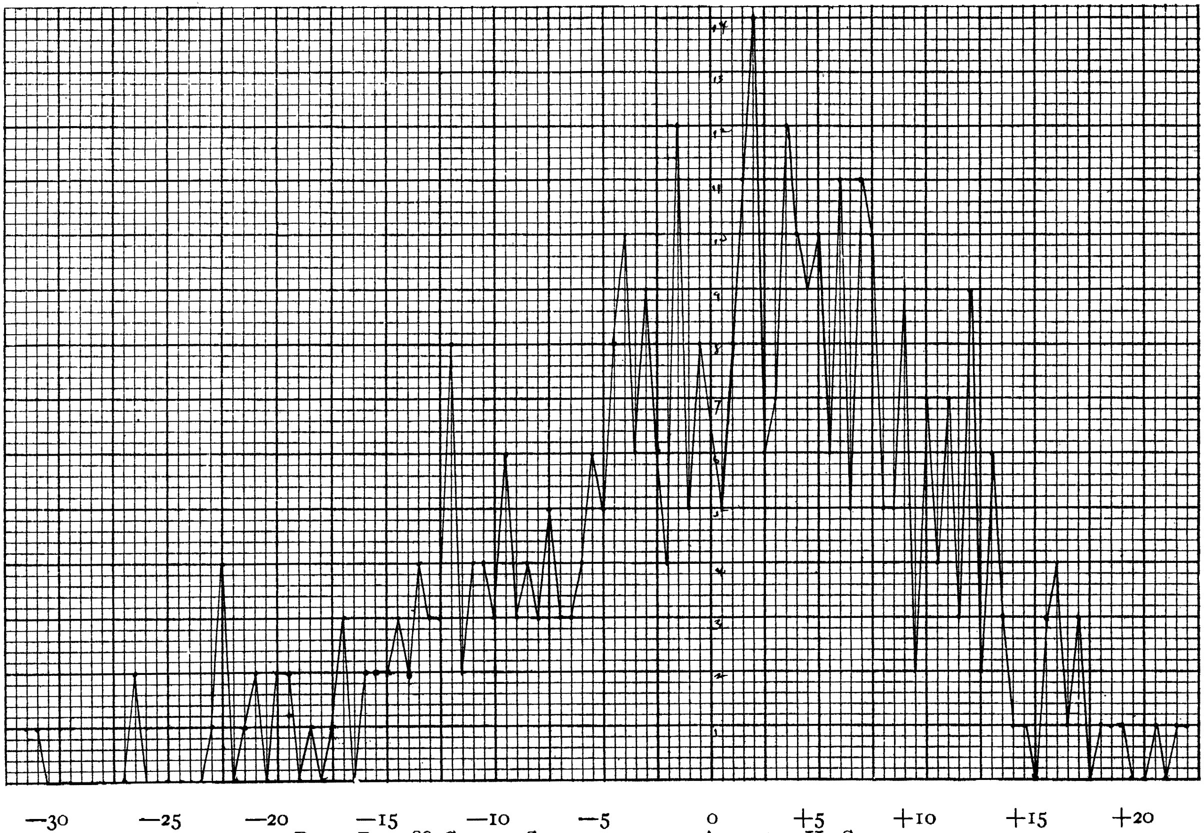
No.	Year.	Longest Sig.	Shortest Sig.	Sum.	Mean.	Remarks.
20	1890			1217.5		Book B. Drawn on blanks with lines 139 mm. in length
20	"			1248.0		
20	"			1149.2		
20	"			1146.8		
20	"			1145.5		
20	"			1117.9		
13	"			790.0		
133		76.0	42.6	7814.9	58.8	Plat "C."



PLAT A.—700 CHECKS OF M. D. EWELL.

Each division of ordinate = 1 signature.
" " abscissa = 1 mm.

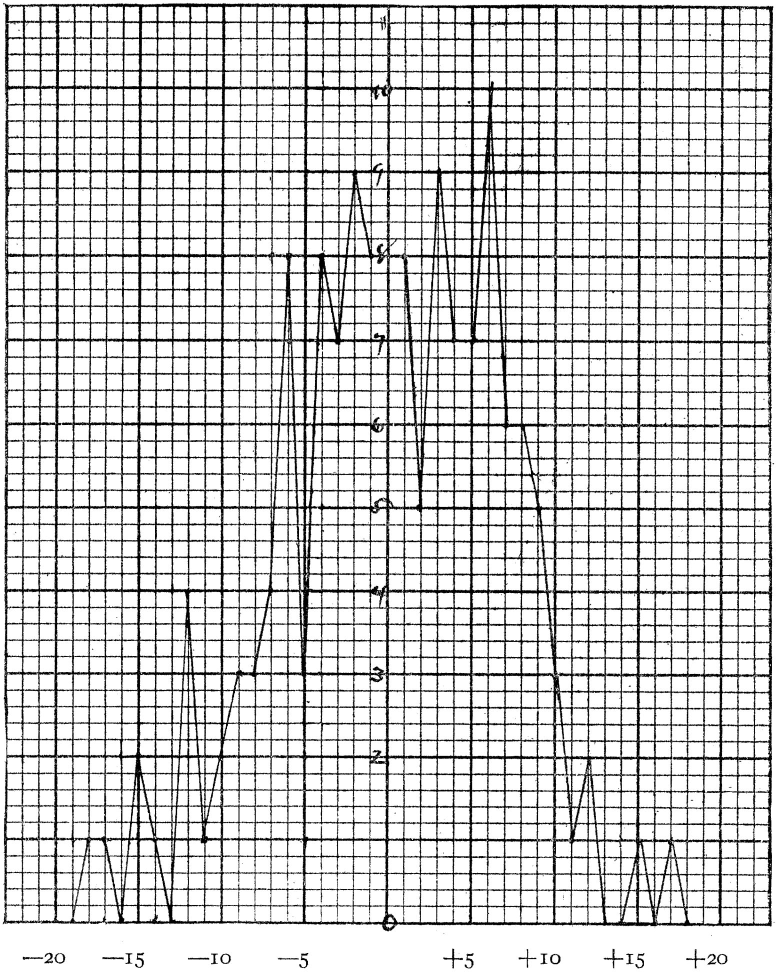
Mean of 700 = 50.2 mm.
Longest " = 75.6 "
Shortest " = 32.8 "



PLAT B.—388 CHECK SIGNATURES OF ALPHEUS H. SNOW.

5 Divisions of ordinate = 1 signature.
1 " " abscissa = ½ mm.

Mean = 77.7
Largest = 109.1
Shortest = 56.0



Plat C.—133 Signatures of Parke Daniels.

5 Divisions of ordinate = 1 signature.
1 " " abscissa = 1 mm.

Mean = 58.8 mm.
Largest = 76.0 "
Shortest = 42.6 "